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An Analytical Study of the Mode Propagation along the Plasmaline[1] DANIEL SZEREMLEY, RALF PETER BRINKMANN, THOMAS MUSSENBROCK, DENIS EREMIN, None, THEORETICAL ELECTRICAL ENGINEERING TEAM — The market shows in recent years a growing demand for bottles made of polyethylene terephthalate (PET). Therefore, fast and efficient sterilization processes as well as barrier coatings to decrease gas permeation are required. A specialized microwave plasma source – referred to as the plasmaline – has been developed to allow for treatment of the inner surface of such PET bottles The plasmaline is a coaxial waveguide combined with a gas-inlet which is inserted into the empty bottle and initiates a reactive plasma. To optimize and control the different surface processes, it is essential to fully understand the microwave power coupling to the plasma inside the bottle and thus the electromagnetic wave propagation along the plasmaline. In this contribution, we present a detailed dispersion analysis based on an analytical approach. We study how modes of guided waves are propagating under different conditions (if at all). The analytical results are supported by a series of self-consistent numerical simulations of the plasmaline and the plasma.

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